Air Safety Week®

Air Safety & Security Trends, Policy and Regulation

Sept. 16, 2002
Washington, D.C.

Vol. 16 No. 35
www.aviationtoday.com

New Technology Enhances Electrical System Safety

Dangerous arcing events can be intercepted before they occur

Arc fault programmable circuit breakers can increase the safety of aircraft electrical systems, while shaving the weight of wiring in the aircraft and reducing the maintenance effort involved in trouble-shooting wiring faults.

This is the promising judgment of engineers at the **Boeing** [BA] Phantom Works in Huntsville, Ala., who are developing new circuit protection technology that could revolutionize the design of aircraft electrical systems and could alter the appearance of the cockpit. Current cockpits feature banks of circuit breakers, characterized visibly by phalanxes of buttons on the overhead panel and in panels behind the pilots. Phantom Works engineers envision a technology that would place the circuit protection devices throughout the aircraft, closest to where they are needed. The concept is known as "distributed power architecture." The breakers would literally be transferred out of the cockpit while control of the devices would remain at the flight crew's fingertips.

A Mess for Maintenance

Complete burnthrough and extensive charring from an arcing event in aircraft wiring. With arc fault circuit interruption [AFCI] technology, a small brown stain might have been the more likely result of an overcurrent event. Many hours of maintenance time to repair this damaged wiring could be saved with the use of AFCI and its associated wire damage location technology. *Source: Boeing*

"The breakers are located where they're needed," said Tom Jobes, an electronics-packaging engineer at the Phantom Works. In an interview last week, Jobes explained the impact of these high-tech circuit protection devices on the pilots.

During flight, should the solid-state device sense an imminent arcing event, it will cut the flow of power on the affected circuit. Similar to the mechanical arc fault circuit interrupters found in residences throughout the country, the new device can cut or interrupt the current before it develops into the lightning bolt of a full-blown arcing event.

"The pilot will get a message on the EICAS [engine indicating and crew alerting system] screen that it's tripping. The message will tell him it's an arc event," Jobes explained.

"On a touch screen, the pilot will have the ability to reset the device a certain amount of times," he added. On a flight critical system, the device might be programmed to allow just one reset in flight. For example, during the fatal January 30, 2001, flight of **Alaska Airlines** Flight 261, in which the crew lost control of the horizontal stabilizer, they had reset the breakers for the electric motors driving the jackscrew some eight or nine times, according to documents produced as part of the **National Transportation Safety Board**'s ongoing investigation. Had the Flight 261 pilots reset the breakers to the balky pitch trim system

just once or twice, they might have been able to retain sufficient pitch-trim control to successfully execute an emergency landing.

Preflight wiring health check

The new devices also would serve a new function before flight. "My vision for the future is the pilot gets a go/no-go for the wiring in the aircraft and gets a diagnostic on a small screen," Jobes said. The preflight checks of wiring integrity might not be for all circuits, but would apply as a minimum to flight critical circuits. For example, the **Aging Transport Systems Rulemaking Advisory Committee** (ATSRAC) is calling for enhanced zonal inspections of aircraft wiring, with primary focus on cockpit wiring, wiring in the electronics and equipment (E&E) bay, and power feeder cables *(see ASW, July 15, p. 1)*. These three areas of focus do not include all flight critical circuits, such as those to engines and flight control surfaces, but it is evident that the new circuit protection devices could be installed per specification to cover any amount of the 100 or more miles of wiring in a modern jet.

The preflight check would exploit the time domain reflectometry [TDR] that is integral to the Boeing design. The solid state power controller [SSPC] may prevent power from being applied to a circuit should the TDR detect a suspect short circuit. The SSPC would prevent turn-on in the face of a short circuit. If an arc occurs on the wire, the TDR kicks in and records the point at which it occurred *(see ASW, July 15, p. 7 illustration)*.

The devices could serve the functional equivalent of built-in test equipment (BITE) to check the integrity of the wiring. Anomalies could be further validated or checked by a ground support test device.

The circuit protection project has its roots in the International Space Station. Jobes recalled Boeing's involvement in the design of SSPCs for the space station. "These boxes reduce 120-volt DC power to 28-volt DC power and distribute it to experiments, which are arrayed in racks," he said.

"We built these SSPCs for NASA [**National Aeronautics and Space Administration**], and then we started looking at how to take this space technology and advance it" to other applications, Jobes explained.

Closer to earth

About a year ago, he said, "We started to hear a lot about arc fault circuit protection" and the need for this kind of protection in commercial aircraft. "We looked at the time domain reflectometry to help locate the source of any wire damage," Jobes added.

The goal is to license the technology for production.

"We see its application in new aircraft, such as Boeing's Sonic Cruiser, and in aging aircraft to replace existing circuit breakers," Jobes said. "The wiring in those aircraft is getting old, it's easy to damage, and we are having too many arcing events," he said. There is no question that wiring degrades over time, and **General Dynamics** engineers are exploring new techniques to monitor wire integrity during maintenance. A

Air Safety Week
ISSN 1044-727X

Assistant Editor: Eric Grasser, *egrasser@pbimedia.com*
Editor-In-Chief: David Evans *devans@pbimedia.com*
Managing Editor: Fred Donovan *fdonovan@pbimedia.com*
Senior Managing Editor: Jim Rogers
Contributing Editor: Dr. Alex Richman, M.D.

Director of Marketing: Jill Braun *jbraun@pbimedia.com*
Production Manager: Tracey Lilly
Publisher: Diane Schwartz
V.P. & Group Publisher: Heather Farley
President CEO: Don Pazour

For Advertising Call Jill Braun: +1-301-354-1694

Send press releases to:
Eric Grasser, Assistant Editor
FAX: +1-301-762-4196, *egrasser@pbimedia.com*

paper by Eric Petersen and David Veecks at GD's Airborne Electronic Systems Division contains a vivid description of the effect of repetitive wetting of wire *(see box, right)*.

For new aircraft, Boeing's programmable circuit protection technology can reduce the amount of wiring in the aircraft. With the circuit protection devices located closer to where needed, "You can shorten the cable runs," said John Maxwell, a Phantom Works engineer deeply involved in the project. The wiring would not have to be run 100 feet or so to breakers located in the cockpit. Rather, the distributed wire lengths would be closer to 20-25 feet. "We see a 10 percent reduction in the weight of wiring," Maxwell maintained.

The maintenance benefits may be even more significant. With the ability to locate the damage on a wire to an accuracy of 2-3 feet, the task of hunting down the source of damage is simplified. Rather than replacing a dozen or more wires, only the single damaged wire would have to be replaced.

"Whoever gets there first with this technology is going to save the maintenance folks a ton of time," Jobes asserted. He envisions repair times being cut by around 50 percent.

'An Archipelago of Conductive Islands'

'Arc Fault Diagnostics in Aircraft Electrical Systems' (extracts)
By Eric Petersen & David Veeck, General Dynamics Airborne Electronic Systems

"Micro-Energy High Voltage [MEHV] is a qualitative method for testing the integrity of wire insulation. [It] specifically identifies those insulation breaches that are likely to, or have already degraded to the point of failure, resulting in arcing between conductors, between a conductor and the aircraft frame or other low-impedance paths to ground that might include salt bridges or carbon tracks.

"Conductive salt bridges are a result of the constant wetting and re-wetting of the harness environment. Ionically contaminated condensation water is an electrolyte that conducts current across any gap where arcing may occur. Current produces heat and the heat evaporates the water each time, leaving behind molecular islands of salt that eventually form a kind of archipelago of larger conductive islands. This is a repetitive process and leads to an eventual breakdown whose potential is proportional to the sum of the distance between conductive islands."

Source: Society of Automotive Engineers Paper 02PSC-7; >> Petersen, e-mail eric.petersen@gd-aes.com << ■

With the breakers located closer to where they are needed, relays can be eliminated. The new circuit protection device functions as both switch and breaker.

"In a galley, when used in power management and distribution systems, these devices would automatically balance the loads among the ovens, the coffee pots, and so forth," Jobes said.

Multiple benefits

For older jets, referred to as "legacy aircraft" in a recent Phantom Works paper on the technology, the new circuit protection devices would not necessarily by installed as a one-for-one replacement of the circuit breakers currently installed. Rather, an entire panel of breakers would be replaced with the new solid-state technology. The lugs on the backside of the panel "would be in the same location, so the aircraft wiring would not have to be rerouted," Jobes explained.

Beyond efficiencies in the amount of wire and in wiring maintenance, the biggest gain is seen in safety. The devices offer quicker response to an arcing event. There are numerous cases where dangerous arcing events have occurred on legacy aircraft, and the breakers did not trip. The arcing damage occurred before the heat built-up sufficiently to trip the more conventional mechanical breakers, which are thermally activated.

Challenges remain in developing this promising new technology. Reducing the size of the devices is one challenge. Electronics create heat, and in shrinking the size, Jobes explained, "You have to get the heat off."

"We also need to test more against different [electrical] loads and different types of arcs," he said. These challenges will be addressed in the next nine months.

How ready is the technology for deployment? On a scale of zero to 10, with zero representing a concept in the mind, and ten signifying a technology ready for production and deployment, Jobes said, "We're at about a five." He is nevertheless confident that the new technology "will be on the market by 2005."

>> Jobes, e-mail thomas.l.jobes@boeing.com; Maxwell, e-mail john.m.maxwelljr@boeing.com << ✈

ACCIDENTS AND INCIDENTS [1]

DATE/SITE	AIRCRAFT & REGISTRATION	CIRCUMSTANCES	DEATHS & INJURIES	PRELIMINARY ANALYSIS [2] & INVEST. ID#
29 Aug 02 2130 Ft Lauderdale-Tampa, fl	B1900 of Continental Connection Reg: GFT9451	A/C left main gear turned 90 degrees after landing rwy18L.	Nil/15 on board	Fracture in main landing gear socket. ATL02IA165
29 Aug 02 Jo'Burg- Sao Paulo	B747-200 of SAA Flt: SA205	Aircraft safely aborted its takeoff after an engine stalled.	Nil	Around this date, another SAA 747 experienced an engine fire on takeoff from JNB to FRA.
30 Aug 02 2215L SLC Ut - Pasco Wash	CRJ of SkyWest CL-600-2B19 R JET Reg: 438SW	A/C had a bird strike 8 miles west of Salt Lake City Utah	Nil	Nil further details.
31 Aug 02 Frankfurt - Singapore	747-400 of Garuda Flt:GA793	On approach, the aircraft experienced severe turbulence.	4 minor injuries	A/C landed SIN and continued to Denpasar after inspection.
31 Aug 02 early a.m. hrs HK-SanFrancisco	747-400 of Cathay Flt:CX782	4:5 hrs into flight experienced fault with engine #3 and returned HKG.	Nil	Passengers were transferred to another 747 that took off at 02:00 for SFO.
1 Sept. 02 Heathrow UK	B747-436 of BA Reg: G-BNLN	Aircraft returned to LHR soon after takeoff.	Nil	Low pressure indication in the #2 hydraulic system.
3 Sept. 02 Melb (Essendon) Vic Australia	4 x BAe 146-200 of defunct Ansett	Stored aircraft damaged by violent storm as velocities of up to 125 km/h swept through Melbourne area	Nil	Empty aircraft were caught by severe gusts & blown together in a corner of the airport. Substantial damage to each.
4 Sept. 02 1851L Manila Int'l (Ninoy Aquino)	DHC-7-102 Dash 7 of Spirit Reg: RP-C2788	On appch to Caticlan, unable to lower the right main gear s. A/C returned Manila making a belly landing on r/way 24.	Nil/49 on board	Dash 7 skidded onto grass where it came to a safe stop. Damaged beyond economic repair.
7 Sept. 02 0527L Tokyo-Singapore	MD-11 Flt: FDX21	A/C made an emergency landing at Narita with smoke in the cockpit.	Nil/ 2 crew	Emergency landing 15 minutes after taking off at 5:12 p.m. (0812 GMT).
7 Sept. 02 0330L Louisville Ky	727 of Delta Reg: DAL439	Comair Flt. 5775 left wing tip hit DAL Flt. 439 right wing tip.	Nil	Parked at gate 5. No passengers on A/C. No damage reported.
7 Sept. 02 Novosibirsk-Hannover	Tu154 of Aeroflot	A/C made an emergency landing at Omsk enroute	Nil /155 pax & 10 crew	Pilots reported low oil pressure in engine #1 while enroute.
9 Sept. 02 1255L Glasgow-Heathrow	A319 of BA Flt:1483	Landed after enroute hyd failure and runway was blocked	Nil/ 140 pax	Runway closed for 20 mins.
9 Sept. 02 Bombay-Mali-Mahe	737 of Air Seychelles	Passenger armed with knife tried to enter the cockpit enroute Mali.	Nil/ 77 crew/pax	Indian National- 41 year old construction worker overcome by crew and pax- after being smothered by female F/A.
10 Sept. 02 1015L Rome (Naples-Gatwick)	737 of BA Flt:BA2607	Petrol leaking enroute from tank of small electric generator stowed under pax seat.	Nil/132pax	Two Irish musicians detained after Flt BA2607 diverted Rome. Pax arrived London over 10 hrs late.
11 Sept. 02 Gander Newfoundland	DC-8-63 of Arrow Air Reg: N441J	Cargo flt collided with W.I.P. construction barriers during landing rollout on runway 4	Nil/5 crew	Temporary barricades on a runway shortened by construction at r/way 22 threshold (9,150/10,500ft avail)
11 Sept. 02 Fort Smith Ark Memphis Tenn. to Las Vegas	A320 of NWA Flt:979	Diverted Fort Smith when 4 pax behaved strangely, incl three who locked themselves in a restroom, possibly shaving their body hair.	Nil/94 pax and 5 crew	Men appeared of Middle Eastern descent. Police negotiated with 3 of them through locked bathroom door after passengers deplaned. Not believed terrorist related (by TSA).
11 Sept. 02 Dubai-Perth WA	777-200ER of Emirates Flt:EK401	Flt diverted to Kuala Lumpur Intl and then returned Dubai.	Nil	Unknown major mechanical problem required a return to base.
11 Sep 02 1308L Houston	Fokker 100 of AA Flt:1702	Fighters escorted A/C back to Houston after a disturbance	Nil/50pax	Two men questioned (reported knife was a comb)

[1] Air carrier incidents or accidents, or other accidents involving serious failures or fatal injuries, investigated by national transportation safety boards.

[2] DISCLAIMER: The information obtained from these National Reports is preliminary, possibly incomplete, and may be supplemented by new findings of fact as the inquiry progresses. These assessments, based on a reading of initial reports, are not intended to assert probable cause or liability, but rather are intended to provide insight pending publication of a final report of investigation. [3] A/P=Airport.

- Data compiled from National Aviation Authority's documents. Preliminary analysis by John Sampson, Director of Aircraft, Engineering & Technical Operations, International Aviation Safety Association.(IASA)

SPECIAL REPORT

One Year Later: The Shaky State of Security

Poll: Consensus on cause, wide divergence of views on solutions

There is no consensus among security experts and officials about what to do next to improve aviation security. There is virtually unanimous agreement that the terrorist attacks of Sept. 11, 2001, served as a tragic stimulus to improve the system, but the record of effort in the year since is mixed.

> "History will view the changes made in aviation security in the first year after 9/11 as a futile exercise in political correctness that cost billions, put the airline industry in financial ruin and created a very small increase in real security. We have created a case study in the inability of our government and society to think clearly and respond to a clear and present threat."
>
> Capt. Tracey Price, Chairman, Airline Pilots Security Alliance

These are the primary themes emerging from a recent poll of persons with intimate knowledge of the aviation security system. Responses last week from Hank Krakowski, vice president of safety and security for **United Airlines** [UAL] and Larry Wansley, head of security for **American Airlines** [AMR], were received first *(see ASW, Aug. 9, p. 9)*. Each airline had two jets hijacked Sept. 11. Krakowski's and Wansley's responses were part of an exclusive Air Safety Week and Airport Security Report poll of industry experts.

Respondents were asked three questions. They were asked to provide a retrospective assessment of the state of aviation security on Sept. 11, 2001, the effectiveness of efforts since that terrible day to tighten security and three proposals for what they would do at this point forward.

We have taken the liberty of giving a grade to characterize the tenor of the responses:

Question	Overall Response	Grade
State of security Sept. 11, 2001?	The tragic cost of complacency	E
Effectiveness of actions since?	Muddled through or wasted time	C to D
Top three recommended actions?	No emerging consensus	Incomplete

On the basis of the respondents' recommendations, the way forward is uncertain. If passion is the common element in their positions, opinions nevertheless diverge widely as to how best to proceed from this point forward. Consider three examples:

• **Trusted traveler concept:** The two airlines most affected by the horrible losses of Sept. 11 do not agree. American's Wansley advocated a trusted traveler program, while Krakowski gave "last priority" to the concept in his hierarchy of security needs. A similar variance emerged from the other respondents. To avoid passenger screening gridlock, the **Reason Public Policy Institute** also endorsed the trusted traveler concept in a recent report. However, independent reviewers of the Reason reports were notably reluctant to endorse the trusted traveler concept. What may work in Israel is not likely to work in the United States *(see box, p. 8)*.

With respect to Krakowski's implied concern that a "trusted traveler" may be an illusory oxymoron, it may be useful to recall the actions of passenger Pablo Moreira. On Feb. 6, while on United Flight 855 from Miami to Buenos Aires, Moreira had to be subdued with a crash axe while attempting to batter his way into the cockpit. As a United frequent flyer, he had whiled away his time in the Red Carpet lounge before boarding. He had no criminal record, sources say. Yet the flight crew at first feared that Moreira was part of a group of terrorists bent on hijacking the plane *(see ASW, Aug. 26, p. 10, "Here we go again")*.

However, in a Sept. 10 overview to Congress of the security situation, the new head of the **Transportation Security Administration** [TSA] endorsed the concept, preferring to label it the "registered passenger" concept *(see box, p. 7)*.

• **Location of explosives detection systems** (EDS). While the merits of screening all bags with EDS technology are generally agreed to, respondents differ on where the machines should be located. Krakowski elucidated the concept of a "super portal" approach where the passenger, his or her checked bags and any carry-on items would be scrutinized at one location. This approach clearly implies locating EDS machines on the main floor of the airport. Others believe the EDS machines are best placed out of sight, integrated into the below-decks checked baggage-processing system.

• **Airport Improvement Program (AIP) money.** With all the other modernization needs at the nation's airports, some respondents argued that AIP money should not be tapped for security improvements. Others took the opposite view, suggesting that AIP funds should be used for this purpose. *(Cont'd on p. 6)*

The divergence of opinions of course provides an opportunity for Adm. James Loy, the new head of the **Transportation Security Administration** (TSA). Out of contentiousness, clarity – that is Loy's challenge. The first director, John Magaw, did not last a year in the job and left amidst criticism that the TSA under his stewardship had ballooned into a huge "mountain of marshmallow."

What follows is a sampling of the respondents' views. The participants included airport and airline executives, former government officials, pilots, academics who have labored in the vineyards of security, and consultants. It is by no means a representative sampling, but while some comments are acerbic, others are profound. Like Prof. Arnold Barnett's remarks, the picture is not entirely bleak, and all the responses bring a frank honesty to the situation.

Rather than grouping the comments by responder, they have been aggregated by question. By this means, we hope to facilitate comparison of the views expressed by the various participants. In a few cases, the participant's response to only one or two of the three questions is presented. Clarity of thought and succinctness of argument were the guiding principles in the editing process. And, with the deadly seriousness of the subject topmost in mind, it is evident that the gift of vivid expression can both entertain and educate.

The responses follow:

› What do you think will be the legacy for aviation security of the terrorist attacks of Sept. 11?

• **Capt. Paul Rancatore, Deputy Chairman, Allied Pilots Association National Security Committee**

"Aviation security is an oxymoron. Sept. 11 highlighted the numerous vulnerabilities throughout the global aviation system."

• **Capt. Jon Weaks, President, Southwest Airlines Pilots Association**

"The legacy that will haunt us is the fact that the security system in place pre-9/11 was inadequate and a total failure. Each of the terrorists who boarded the aircraft did so in a legal manner. Screeners, foreign nationals many of whom were incapable of speaking and understanding the English language, were charged with protecting the traveling public ... These low paid and uneducated screeners provided the fertile breeding ground to allow [the] events of 9/11 to occur."

• **James Wilding, President and CEO, Washington Metropolitan Airport Authority**

"The exact dimensions of the impact of Sept. 11 are still unfolding. What is quite clear is that the future growth and stability of the aviation industry is highly dependent on defining and operating a level of security which offers solid protection while staying within a realistic realm of passenger and cargo throughput capacity and economics."

• **Richard Vacar, Director of Aviation, Houston airport system and Chairman, Airports Council International – North America** [ACI-NA]

"With any luck, we will have taken the necessary steps to get [the] FAA out of the security business, a function it was never really good at."

• **Duane McGray, President, Airport Law Enforcement Agency Network** (ALEAN)

"It is sad that it takes tragedy to force action."

• **Brian Sullivan, FAA special agent (retired)**

"The 'façade of security' was exposed ... the legacy is that the public's desire to travel is diminished, the airlines are on the brink of bankruptcy and the continuing 'façade of security' leaves us vulnerable to the aviation industry being dealt its death blow by another attack – that one most likely [involving] multiple aircraft with bombs in the cargo hold on a given day."

• **Steve Elson, former FAA special agent (Red Team)**

"Sept. 11, 2001, will be a far greater day of infamy than December 7, 1941."

• **Former FAA investigator (Red Team) who requested anonymity**

"Sept. 11 was a huge intelligence failure, not a security failure. But, for Congress, it was easier to pass a bill 'fixing' aviation security than to tangle with [the] CIA and FBI. If anybody had told the FAA that there was a serious suicide threat in the United States using knives, the security procedures would have changed.

"And why did [the terrorists] use knives and box cutters? Because they thought that weapons and explosives would have been discovered. Although the system certainly needed improvement, it was robust enough to deter the 9/11 hijackers from using guns."

• Cathal "Irish" Flynn, former FAA associate administrator for aviation security

"Given our record in the United States, it is hard to say whether there will be a permanent legacy. But the government and industry are now dealing with aviation security in a categorically different way. Funding has increased 50-fold, which is of enormous importance, even though the aviation security budget is still inadequate, needing to be doubled from its proposed 2003 level ... In resources, that means a federal aviation security budget of $10 billion per year forever, until the threat goes away."

• Douglas R. Laird, consultant, former Northwest Airlines head of security

"Aviation security is often referred to by critics as being driven by a *Tombstone Mentality*. Unfortunately, history shows this to be the case ... Following the events of Sept. 11 the Department of Transportation implemented a number of actions [that] on their face were meant to bolster the public's faith in civil aviation but were for the most part symbolic and did little to improve or enhance security.

"The Congress enacted poor legislation that did not clearly address the issues, formed the Transportation Security Administration [TSA] and then balked at providing adequate funding to carry out the mission of the TSA.

"To make matters worse, the Secretary of Transportation [Norman Mineta] then backed off the EDS [explosives detection system] standard that had taken years for the FAA to put in place and allowed the substitution of ETD [explosives trace detection] for EDS in our smaller airports, an act that cannot be justified in other than political terms.

"All in all, the U.S. government has squandered hundreds of millions of taxpayers' dollars by allowing the TSA to disregard all previous work of the FAA and its scientists and allowed multi-million dollar contracts to be let to corporations that have no experience in aviation security to advise the TSA on how to carry out the mandates of Congress.

"The deadlines imposed by Congress will never be met, inferior

New TSA Head Struggles To Reshape Agency

Sept. 10 testimony of Adm. James Loy, acting under secretary of transportation for security, to the Senate Commerce, Science & Transportation Committee (extracts):

› Perception of the TSA:

"When I assumed the helm ... I was concerned about the perception of TSA stakeholders as an aloof or arrogant agency that had only one way of doing business – 'My way or the highway.' "

› On meeting the Nov. 19 deadline for federal screeners at all airports:

"By the end of August we had hired 26,845 screeners. That number should increase to approximately 32,000 by the end of this week ... I am confident we will meet the November 19 deadline."

› On meeting the Dec. 31 deadline for 100 percent baggage examination by explosives detection systems [EDS]:

"I do not support the wholesale delay in the December 31 deadline ... The December 31 deadline enables us to focus our efforts. [At] a small number of airports, it may be necessary to push back the deadline for a modest amount of time, while temporarily putting in place other methods of screening checked baggage."

› On "common sense" passenger screening:

"I have charged my staff with taking aggressive steps to reduce the 'hassle factor' at airports and eliminate what I call 'unnecessary rules.' I have revised the policy on passengers carrying beverages through ... checkpoints. We will now allow paper or foam polystyrene cups to pass with the passenger through the metal detectors. Factory sealed or closed plastic, metal, glass, or ceramic containers are permitted through the x-ray machines. We will not, however, allow open cans of soda or other beverages through the screening checkpoints. We are also reminding all our screeners ... that they are prohibited from asking passengers to drink or eat from any containers of liquid or food.

"A second common sense change that we have made is to eliminate the 16-year old questions asked at ticket counters and at curb-side in whether the passengers had control of the bags at all times or had been asked by others to include items in their bags. These questions have not proven to enhance security."

› On the "trusted traveler" concept:

"I am going to refer to this program from now on as the 'registered traveler' program ... For those who register ... we will know more about them from a security standpoint than anonymous passengers who present themselves to screeners at the airport. This enhances aviation security."

› On arming pilots:

Loy referred to the findings of a task force he convened to explore the "great controversy" over the issue of arming pilots. If forced by Congress to do it, Loy outlined his concept of compliance.

"I have to tell you that it is the recommendation of the task force that pilots not be armed with either lethal or less-than-lethal weapons. However, the task force advised that if pilots are armed, it should be through a carefully controlled ... test program ... furthermore, to prevent pilots from having to openly transport firearms through secure airport areas and in off-site locations where pilots may overnight between flights, the task force recommended a lock-box system for carrying the weapons. The firearm would fit into a sleeve installed within the cockpit. Were the pilot to leave the flight deck for personal or flight-related reasons, the pilot would be required to secure the firearm again in the lock-box. Thus, the firearm would only be available for use on the flight deck during flight operations, as intended." ■

Rethinking Checked Baggage Screening

Reason Foundation Policy Study 297, July 2002 (Extracts. The report by Viggo Butler and Robert Poole, Jr., is a response to the fact that the goal of screening 100 percent of checked bags for explosives by Dec. 31, 2002, is not likely to be achieved.)

"Congress should revisit the baggage inspection issue, drawing on the experience of Europe and Israel, which have many years of experience in dealing with terrorist threats to aviation.

"In Europe, where 100 percent checked-luggage screening is close to being a reality, most airport use basic automated x-ray systems for the first level of baggage screening. While not as accurate as EDS (explosives detection system) machines, they are much faster and much less costly ... [it] permits the slow, EDS machines to be used only for exceptional bags. Among the airports relying on such layered system for 100 percent bag screening are Athens, Heathrow, and Manchester. Automated x-ray machines are not currently certified for use at U.S. airports.

"Israel pioneered the certified traveler concept, when it become clear that its rigorous passenger screening protocols were overkill for Israeli citizens."

The Reason report goes on to explain that trusted travelers' bags are x-rayed but they bypass the EDS machines.

An independent assessment:

We asked Dr. Arnold Barnett, an expert in checked baggage security at the **Massachusetts Institute of Technology**, and Billie Vincent, former **Federal Aviation Administration** head of security and now president of a security consulting firm, to comment:

Barnett: "The authors are optimists about the ability of CAPPS-type [computer assisted passenger prescreening systems] to identify high-risk people. Note that they have no statistics to back up this optimism. They also seem unworried about the false-negative rate in European screening methods that start with the x-ray machines, which cannot detect explosives. Fool the x-ray machine, and you've won.

"Despite their admiration for Europe and Israel, the authors have nothing to say about positive bag-match, which is universally used in these places. Can anyone imagine an El Al flight without positive passenger bag-match, despite the interrogations, explosives detectors, and everything else?

"In the United States ... we do PPBM now only on originating flights ...It frustrates me that, in connecting PPBM, we have a security measure that costs almost nothing, that need not cause any hassles at airports, and that can be implemented quickly. I know of no passengers who want to travel with unaccompanied checked luggage."

Vincent: "The European system ignores two major threat categories of explosives. That's why they get the fast Level 1 processing rate. In effect, they are ignoring the most dangerous threat category ... There is now one U.S. piece of equipment that can be installed as a Level 1 unit that can detect the two threat categories ignored by the European systems. The Reason report mentions the technology but apparently doesn't realize its individual significance!

"As to the 'trusted traveler' program, there is no such thing in the U.S. with the diversity of our population. Israel has two elements, them versus us and the Israelis will never clear an Arab as a trusted traveler. In the U.S. we have 'all of us' in our multi-racial, multi-ethnic, multi-religious, multi-philosophies, multi-ad nauseum. And if you have carefully followed the persons who have been arrested, incarcerated, prosecuted, expelled, etc. since 9/11 by our government, you can only come to one conclusion, i.e., that anyone can build a cover to qualify for any U.S. Trusted Traveler Program, over a period of time. Moreover, being excluded from such a program will be the basis of many discrimination lawsuits.

"All the foregoing notwithstanding, the Reason report offers the best blueprint I've seen for a resolution of our problem of the Dec. 31, 2002, deadline for the installation of EDS."

>> Reason Institute www.rppi.org; Barnett, e-mail abarnett@mit.edu; Vincent, e-mail bhv@asiwebsite.com << ■

technology will be rushed into airports and, at the end of the year ... security will be only slightly improved, not by the fact that screeners are quasi-government employees but because there are more screeners per checkpoint and they have more time to carry out their searches."

• Arnold Barnett, professor of operations research, MIT

"The main legacy will be widespread awareness that aviation fascinates terrorists, and that the industry can probably never again treat the threat as remote. Indeed, of the three events in the United States since 9/11 – the anthrax scare, the shoe bomber's attempt to destroy a Trans-Atlantic jet, and the shootings at Los Angeles International Airport – two were related to aviation."

• Mike Boyd, consultant, The Boyd Group

"It was the day we ran out of luck. Congress had been warned repeatedly prior to 9/11 that the FAA was lax in security oversight and that a terrorist act against U.S. aviation was highly possible. The legacy is that Congress and the administration are more concerned with protecting the sloppy DOT (and now, TSA) bureaucrats than in implementing better security. Not one high-ranking FAA/DOT security official has ever been called to account for 9/11 ... It's a legacy of shame."

• Seth Young, Associate Professor, Embry-Riddle Aeronautical University

"The events of Sept. 11... were so severe that aviation security may remain a top priority for far longer than previous events ... The need to prevent attacks by preventing terrorists themselves to board or place explosive devices on aircraft has become the goal, whereas before Sept. 11 the goal was merely to prevent only the weapons from getting on board."

"Finally, Sept. 11 may be the evidence that aviation security cannot operate in a vacuum. Careful strategic coordination between local,

state, federal and world agencies must be in place to accurately pre-determine an aviation security threat and thwart the threat, perhaps log before the terrorist ever reaches the airport."

› What is your opinion of the efforts made to improve aviation security over the past year?

• **Rancatore, pilots union**
"Unfortunately, we have only reduced the probability of success from 100 percent to 90 percent."

• **Elson, former FAA security**
"Civil aviation security has deteriorated. We are paying billions for worsening security and abuse ... Despite all the 'cumbayas' and staged photo ops, it is still business as usual ... because there is no accountability."

• **Laird, consultant**
"The changes [since Sept. 11, 2001] have been minimal at best ... just a 'throw technology at it' attitude. The deployment of EDS is a good thing as it allows nearly 100 percent detection of IEDs [improvised explosive devices]. However, EDS or the lack thereof has nothing to do with what happened on Sept. 11."

• **Young, Embry-Riddle**
"Decisions have been made to spend outrageous levels of funding in a most inefficient manner."

• **Barnett, MIT**
"There has been movement on several fronts. Clearly, there has been an increase in the screening of passengers and their carry-on and checked luggage. Other measures include strengthening cockpit doors and background checks on aviation personnel. Yet there is still a large gap between where we are and where we should be. For example:
✓ *Checked luggage:* The goal has been to put all checked bags through explosive detectors by the end of this year. We are enormously far short of that ... We now have positive passenger bag match [PPBM], but only for originating passengers. Connecting passengers are exempt, even though this 'loophole' has been widely reported and sharply criticized, and three separate experiments have shown that extending PPBM to connecting travelers is highly feasible.
✓ *Passenger screening:* It is still not too difficult to sneak items like cardboard cutters onto an airplane. But the transition to a new federal workforce and new training programs have scarcely begun, so it is premature to announce that physical screening of passengers serves more to annoy people than to enhance security."

• **Boyd, consultant**
"There is no direction. If overwhelming bureaucracy and management incompetence will deter terrorism, then we're the safest country on earth."

› If you could do three things to improve security, what would they be?

• **Weaks, pilots union**
"Demand biometric verification and identification for *all* personnel who have access to the aircraft and cockpit. Under no circumstances would any branch of government employee be exempt from total and complete verification and identification. Next, airport operations area security must be enhanced. Today, little has changed to ensure all those individuals who have access to the aircraft via airport gates on the operations area are checked and identified. Finally, cargo security must be enhanced to ensure [that] cargo placed on the aircraft is free of explosive devices."

• **Wilding, Washing D.C. airport authority**
"(1) Give airports a true partnership role in developing security ...
(2) Continue to develop the smart technology that puts the focus on knowing who is getting on our aircraft as well as what they may be bringing onto that aircraft.
(3) Rethink the [government] judgment that only ticketed passengers are permitted beyond the security screening points. The result is that the screening points have become major activity centers within the terminal, with long lines of passengers waiting to be screened and large numbers of non-passengers either seeing-off or greeting passengers. This approach gathers, and exposes, large numbers of unscreened persons, which is a security issue."

• **Vacar, Houston airport system & ACI-NA**
"We need to shrink the security haystack as much as we can. That means better profiling, less political correctness, and programs such as the 'trusted traveler' [to] help reduce the screening effort, thereby enabling the system to better screen the real threats. It will be much easier to find that needle." *(Cont'd on p. 10)*

• McGray, ALEAN
"(1) Implement in-line EDS systems in baggage rooms rather than the expensive and temporary fixes in the ticket lobbies of airports.
(2) Improved employee screening procedures that include criminal history records checks and employment history checks to eliminate the present system.
(3) Appropriate funding sources [to] pay for security improvements that do not raid capital improvement funds under the AIP program that are desperately needed for future infrastructure needs."

• Young, Embry-Riddle
"(1) Put authority for airport security in the hands of local airport management. Each airport is a unique, with only the local administration having a complete understanding of any particular airport.
(2) Allow Airport Improvement Program [AIP] funds to be used for any security related enhancement program.
(3) Have the TSA provide a reasonable set of ... performance metrics ... These metrics shouldn't be regulations like, 'Thou shalt have 100 percent baggage screening by use of one of two TSA approved devices,' but more like, 'Less than X percent of all attempts to pass prohibited items through security should be successful.' Let the airports figure out the best way to reach the desired level of performance."

• Barnett, MIT
"(1) Immediately implement connecting bag match, and end what the statistics suggest is near-stagnation in the deployment of explosives detectors.
(2) Keep monitoring the passenger screening process for effectiveness, and not be discouraged if progress is slow. At the same time, move full speed ahead with 'secondary insurance' like strengthening cockpit doors and improving the training of flight attendants.

"Also, make sure that we have accurate quantitative information on passenger queuing delays at each airport, rather than questionable impressions based on anecdotes and freakish cases. The delay picture may be less bleak than people think. Denver International [airport] already is down to processing times in the 5-10 minute range, while Delta Air Lines – which offered large prizes to its Northeast shuttle passengers who spent over 20 minutes in security and missed their flights – has only given the award to five passengers over three months.
(3) Be wary of those people who adopt Israeli rhetoric about basing security on searching for 'people, not things' but who would never actually use Israeli methods. There is much discussion of computer models that would 'unobtrusively' identify high-risk passengers, and thus allow lesser scrutiny of the huge majority of passengers who pose little risk. But it is not clear that the [computer] models will work, and there is no real way to validate their effectiveness prior to deployment.

"If we cut back on physical screening of passengers and luggage because of unvalidated forecasts about who is dangerous, we could wind up with less security rather than more."

• Flynn, former FAA security chief
"(1) The government must recognize that the present checked baggage screening program will cause an unacceptably large increase in vulnerability and risk, and must modify the program immediately. Screening checked bags in lobbies will create dense crowds, far too easy targets for armed attacks, suitcase bombs, and vehicle bombs. The program should be based on screening with EDS [explosives detection systems] built into the baggage handling system.
(2) Start hiring and training the very large number of armed security agents needed to prevent – or mitigate – attacks in airport lobbies, baggage claim areas, and wherever else passengers bunch up.
(3) Implement 'trusted traveler' or some other profiling system immediately, as the basis for different preboard screening regimes. The existing preboard screening is technologically inadequate to detect the IEDs [improvised explosive devices] likely to be used by [Ramsey] Yousef's or [Mohamed] Atta's ilk."

• Laird, consultant
"(1) Have all airports conduct vulnerability assessments ... and develop a security system specific to each airport. Don't rush in and buy technology that isn't clearly shown to be needed.
(2) Deploy EDS at all airports for the screening of checked luggage and then install the same technology at the screening checkpoints to screen hand-carried items. The ongoing cry that it can't be done by the end of the year is correct, but over the next several years EDS can be deployed and airports should be forced to accept the fact that security has changed forever and they will have to adapt. The same goes for the air carriers – no more stalling and no more endless studies and committees.
(3) Screen *all* persons entering the sterile area of airports and prohibit the entry of privately owned vehicles onto the airport operations area." ✈